

Study Guide

For use with pages 280–284

GOAL Solve proportions using cross products.**VOCABULARY**

Every pair of ratios has two *cross products*. A **cross product** of two ratios is the product of the numerator of one ratio and the denominator of the other ratio. If the cross products are equal, then the ratios form a proportion.

EXAMPLE 1 Determining if Ratios Form a Proportion

Tell whether the ratios form a proportion.

a. $\frac{8}{12}, \frac{10}{15}$

b. $\frac{15}{18}, \frac{20}{25}$

Solution

a. $\frac{8}{12} \stackrel{?}{=} \frac{10}{15}$

Write proportion.

$8 \cdot 15 \stackrel{?}{=} 12 \cdot 10$

Form cross products.

$120 = 120$

Multiply.

Answer: The ratios form a proportion.

b. $\frac{15}{18} \stackrel{?}{=} \frac{20}{25}$

Write proportion.

$15 \cdot 25 \stackrel{?}{=} 18 \cdot 20$

Form cross products.

$375 \neq 360$

Multiply.

Answer: The ratios do not form a proportion.**Exercises for Example 1**

Tell whether the ratios form a proportion.

1. $\frac{16}{20}, \frac{12}{16}$

2. $\frac{15}{75}, \frac{3}{12}$

3. $\frac{18}{32}, \frac{27}{48}$

4. $\frac{25}{65}, \frac{10}{32}$

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CROSS PRODUCTS PROPERTY**Words** The cross products of a proportion are equal.**Numbers** Given that $\frac{2}{5} = \frac{6}{15}$, you know that $2 \cdot 15 = 5 \cdot 6$.**Algebra** If $\frac{a}{b} = \frac{c}{d}$, where $b \neq 0$ and $d \neq 0$, then $ad = bc$.**EXAMPLE 2 Writing and Solving a Proportion**

You need 1.75 cups of lemon juice to make 14 servings of lemonade. How many cups of lemon juice are needed to make 4 servings of lemonade?

Solution

$$\frac{1.75}{14} = \frac{c}{4} \quad \begin{array}{l} \longleftarrow \text{Cups of lemon juice} \\ \longleftarrow \text{Servings} \end{array}$$

$$1.75 \cdot 4 = 14c \quad \text{Cross products property}$$

$$7 = 14c \quad \text{Multiply.}$$

$$\frac{7}{14} = \frac{14c}{14} \quad \text{Divide each side by 14.}$$

$$0.5 = c \quad \text{Simplify.}$$

Answer: You need 0.5 cup of lemon juice to make 4 servings of lemonade.

Exercises for Example 2

Use the cross products property to solve the proportion.

5. $\frac{a}{30} = \frac{2}{12}$

6. $\frac{b}{6} = \frac{8}{12}$

7. $\frac{0.7}{c} = \frac{84}{15}$

8. $\frac{0.64}{16} = \frac{2}{d}$